Air Quality

THE CHALLENGE

Since the U.S. Environmental Protection Agency (EPA) developed regulations targeting six "criteria" pollutants that adversely affect human health and welfare, regulations at the federal, state, and regional level have reduced hundreds of tons of air pollution each day in Southern California. Smog alerts are largely a thing of the past, as smog levels have dropped over 75 percent in the past twenty years.

Despite this progress, air pollution continually plagues Southern California. Much of the region continues to exceed National Ambient Air Quality Standards (NAAQS). The South Coast Air Basin (SCAB), one of the four basins in the SCAG region, still has the worst air quality in the nation (the other air basins in the region include the South Central Coast Air Basin (the Ventura County portion), the Mojave Desert Air Basin, and the Salton Sea Air Basin). The American Lung Association reported that, in 2007, the Los Angeles-Long Beach- Riverside region ranked number one as the most polluted area in the United States.[1]

The pollutants that pose the greatest health concern in the SCAG region are ground-level ozone (O_3) and particulate matter (PM). Ground-level ozone, a component of urban and regional smog, is a colorless and poisonous gas that forms in the atmosphere through complex reactions between chemicals directly emitted from motor vehicles, industrial plants, consumer products and many other sources. Repeated short-term exposure to ozone can damage the respiratory tract, causing inflammation and irritation, and induces symptoms, such as coughing, chest tightness, shortness of breath, and worsening of asthma symptoms.[2]

In recent years, population-based studies have revealed a strong correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality.[3] In addition, ground-level ozone causes substantial damage to crops, forests and native plants, turning leaves brown and spotty and stunting plant growth; it is particularly noxious to crops.

Major technological or political breakthroughs that identify new ways to achieve the federal 8-hour ozone standard by 2024 are imperative. However, this is not an easy task. Our region needs to reduce approximately 500 tons per day of ozone-forming pollution, about half of which is attributable to cars, buses, trucks, and other "mobile sources." While approximately 60% of the reductions are specified by stationary and

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Land Use & Housing: Reducing emissions from local sources of air pollution reduces the potential for incompatible land uses. For example, reducing particulate and toxic air contaminants from manufacturing facilities can reduce conflict with nearby residential uses by reducing ambient pollutant concentrations. This can give jurisdictions more flexibility to site land uses in a region that is becoming more densely populated.

Open Space and Habitat: Achieving federal ozone standards will reduce damage to vegetation and crops, as ozone inhibits crop productivity and can reduce crop yield.

Water: Reducing airborne pollutants will reduce wet and dry deposition that directly pollutes surface water bodies. Studies also show that a substantial amount of nitrogen load to surface water bodies comes from indirect loads caused by surface water runoff.

$PM_{2.5}$ exceedances contribute to over 5,400 premature deaths and one

mobile source control measures in the 2007 South Coast Air Quality Management Plan (AQMP), approximately 40% of the solution relies on long-term measures that are undefined (the "black box").[4]

One of the most dangerous pollutants is particulate matter. Particulate matter is a complex mixture that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. Of particular concern are fine particulates, or $PM_{2.5}$, which are smaller than 2.5 micrometers in diameter (by comparison, a human hair is 70 micrometers in diameter). $PM_{2.5}$ is small enough to penetrate our lungs so deeply that they cannot be expelled by the body. $PM_{2.5}$ comes from fuel used in everything from power plants to wood stoves and motor vehicles (e.g., cars, trucks, buses and marine engines). These particulates are even produced by construction equipment, agricultural burning, and forest fires. South Coast Air Basin residents make up over 50 percent of the population in the nation that is exposed to $PM_{2.5}$ concentrations above the federal standard. It is estimated that particulates contribute to over 5,400 premature deaths annually and lead to nearly one million lost work days in the South Coast Air Basin.[5] These and even smaller "ultrafine" particulates have become a major health concern that must be addressed.

Perhaps the most publicized air quality problem today is the phenomenon of global climate change. According to the U.S. EPA, transportation activities (excluding bunker fuels) directly accounted for approximately 33 percent of CO_2 emissions from fossil fuel consumption in 2006.[5] Our planet has reached the highest emissions levels of carbon-based CO_2, the most prevalent greenhouse gas, in recorded history (see **Figure 6.1**). This unprecedented trend is increasing average global temperatures at alarming rates. A warmer climate would substantially complicate our efforts to fight our historical ozone problems. Further, the impacts of climate change are even more profound, as water supplies, flora and fauna, and nearly every aspect of life as we know it could be adversely affected by a warmer world.

Mobile source emissions, both on-road (e.g. cars, trucks, buses, etc.) and off-road sources (e.g. boats, off-road recreational vehicles, aircraft, trains, ships, industrial and construction equipment, farm equipment, etc.), are the primary culprits contributing to the region's air quality challenges and global climate change. Driving a motor vehicle is the single most polluting thing that most of us do.[7] The 2007 AQMP reports that there are approximately 12 million vehicles in the South Coast Air Basin. In 2002, these vehicles traveled more than 349 million miles per day; they are projected to travel about 407 million miles per day by the year 2020. Motor vehicles emit millions of tons of pollutants into the air each year. Mobile sources account for about 60 percent of all ozone forming emissions and for over 90 percent of all carbon monoxide (CO) emissions from all sources.[8] CARB considers diesel PM to be a potent global warming agent, as it has been responsible for more than half of black carbon emissions in the U.S. and about 30 percent globally. Diesel engine emissions are responsible

for a majority of California's estimated cancer risk attributable to air pollution.[9]

Given the challenges that lie ahead, increased public awareness and a reinvigorated collaborative effort from all agencies and stakeholders is critical to bring this region into attainment with the federal air quality standards. SCAG's contribution to this collaborative effort is essential, as emissions reductions have become front and center of the air quality challenge.

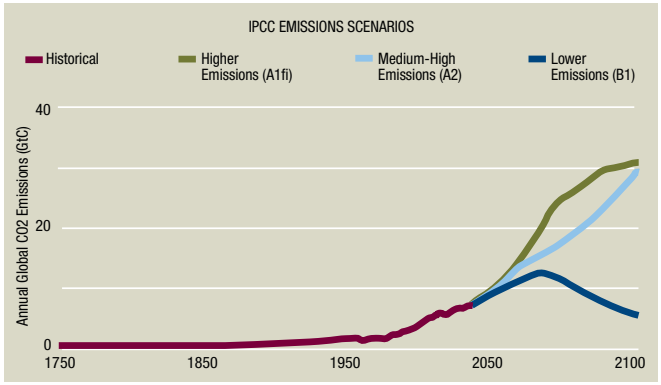
The Growth Conundrum

Although regulations and technological breakthroughs have generally improved air quality, our population growth threatens to overwhelm these gains in the future.

The SCAG region is the largest metropolitan planning area in the United States, encompassing 38,000 square miles and has one of the largest concentrations of population, employment, income, business, industry and finance in the world. Our region faces an exponentially growing population coupled by significant economic growth. Forecasts reveal that the region's population is projected to increase by almost 5.1 million people, from 2008 to 2035, employment by 2.2 million jobs, and the number of households by 1.8 million.[10]

These glimpses of our future underscore a key challenge for the region: How do we make historic reductions in air pollution in the face of continued population growth, increasing urbanization, increasing vehicle miles traveled, and an expanding economy? Accommodating anticipated growth in the SCAG region in a sustainable way—by taking account of ecological, economic and social factors, while enhancing quality-of-life indicators for future generations—represents a central challenge facing Southern California.

FIGURE 6.1
Historical and Projected CO_2 Emissions



Source: International Panel on Climate Change

The Growth in Goods Movement

Southern California faces both an extraordinary economic opportunity and a frustrating policy dilemma. Goods movement in the SCAG region is supported, in part, by its geographical advantage such as deep-water marine ports and highly developed network of highways and railways, availability of trans-loading facilities and its large internal market. The region is a major gateway for both international and domestic commerce, and goods movement is the fastest growing seg-

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Energy: Reducing climate change impacts will mitigate the need to cool a warmer region, which will reduce the need to expand the infrastructure needed to produce electricity and other sources of energy.

Economy: Attaining clean air standards can provide substantial economic benefits. In the South Coast Air Basin, attaining federal ozone standards could add $14.6 billion dollars to the economy on average per year by reducing morbidity, mortality, increasing crop yields and visibility, reducing materials expenditures, and congestion relief. In 2014, an estimated $113 million of savings on vehicle operation and maintenance is expected.

Implementing the South Coast AQMP is expected to generate more than 61,400 jobs per year.

The RCP complements local air plans by emphasizing the need to reduce

ment of the region's transportation sector. Additionally, goods movement plays a vital role in the national, state, and regional economies with one out of every seven jobs in Southern California depending on trade.

The increasing volume of goods moving in and through the SCAG region is straining our infrastructure and exacerbating air quality challenges in three key ways. First, the sheer growth in freight movement could jeopardize current attainment plans for ozone and $PM_{2.5}$. Second, freight-related diesel particulates create toxic air contaminant hotspots that threaten local air quality near the ports and truck distribution routes. Finally, there are institutional challenges, as goods movement is primarily regulated by the federal government. The projected growth in ship traffic, truck volumes and increased demand on the existing railroad capacity will bring with it associated concerns of automobile traffic delays and safety concerns; thus, compromising the quality of life, health and safety of the residents and communities in the region.

THE PLAN

The RCP neither replaces nor modifies the air plans adopted within the region, but rather, it sets the policy context in which SCAG participates in and responds to these plans. The RCP builds off the local Air Quality Management Plan processes that are designed to meet health-based criteria pollutant standards in several ways. First, it complements AQMPs by providing guidance and incentives for public agencies to consider best practices that support the technology-based control measures in AQMPs. For example, the RCP's energy policies will help accelerate turnover of older, more polluting combustion engines that support the South Coast AQMP's control measures.

Second, the RCP emphasizes the need for local initiatives that can reduce the region's greenhouse gas emissions that contribute to climate change, an issue that is largely outside the focus of local attainment plans. Policies such as green building that reduce our "carbon footprint" can have direct impacts on energy, water supply, and other resource areas.

Third, the RCP emphasizes the need for better coordination of land use and transportation planning, which heavily influences the emissions inventory from the transportation sectors of the economy. This also minimizes land use conflicts, such as residential development near freeways, industrial areas, or other sources of air pollution.

The RCP calls on SCAG and local governments in coordination with appropriate state agencies and air districts throughout the region to implement policies that complement the AQMP in the following ways:

- **SCAG**: As the Metropolitan Planning Organization for Southern California, SCAG has a defined role in developing the transportation control measures (TCMs) for local AQMPs. This can include new TCMs that help minimize the region's "black box" of undefined emission

reductions. In its role as a Council of Governments, SCAG can influence a local jurisdiction's actions by providing guidance on policies that address criteria pollutants, greenhouse gases, and public exposure to toxics and other pollutants of concern. SCAG can also be a regional clearinghouse for data, funding information, program coordination, and repository of mitigation measure recommendations for regionally significant issues at the project or General Plan level.

- **Local Governments:** Cities and counties can amend general plans to implement land use, energy, transportation, and other policies that reduce their carbon footprint consistent with State law. In addition, local governments can use their land use authority to properly buffer residences and other sensitive land uses from freeways, industrial activity centers, and other sources of toxics or ultrafine particulates.

Continuing the trend toward attainment of clean air standards will be difficult given the pace of population growth, freight activity from our sea and airports, and increasing congestion from a transportation system with limited opportunities to expand roadway capacity and a heavily-subsidized public transit system. The voluntary actions require a collaborative effort from federal, state, and local government in order to meet the air quality targets.

Historically, there has been an inherent conflict between the objectives of economic development and environmental protection. Today, it is possible to achieve economic growth without sacrificing protection for the environment. However, much more work will be needed to achieve this equilibrium. As such, collaborative efforts undertaken by various federal, state, and local regulatory agencies are necessary in overcoming this challenge.

The goals, outcomes, and action plan of the RCP Air Quality chapter aim to coordinate these activities to help the region develop strategies that utilize the most effective technologies, transportation investments, urban design strategies, which reduce air pollution, improve air quality, and protect human health and the natural environment.

AIR QUALITY GOALS

- Reduce emissions of criteria pollutants to attain federal air quality standards by prescribed dates and state ambient air quality standards as soon as practicable.
- Reverse current trends in greenhouse gas emissions to support sustainability goals for energy, water supply, agriculture, and other resource areas.
- Minimize land uses that increase the risk of adverse air pollution-related health impacts from exposure to toxic air contaminants, particulates (PM_{10}, $PM_{2.5}$, ultrafine), and carbon monoxide.

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Public Health: Reducing ozone levels can reduce permanent scarring of lung tissue and reduce respiratory irritation and discomfort. Reducing $PM_{2.5}$ could significantly reduce the estimated 5,400 premature deaths annually in the region.

Environmental Justice: Air quality policies in the RCP are intended to ensure that minority population and/or low-income populations do not bear impacts that are appreciably more severe or greater in magnitude than the adverse effects that will be suffered by non-minority populations and/or non-low-income populations.

Climate Change: Warmer weather will increase the number of days conducive to ozone formation by 25 to 85 percent. In addition, warmer temperatures could increase fire risk, which would increase potential for particulate matter emission episodes.

- Expand green building practices to reduce energy-related emissions from developments to increase economic benefits to business and residents.

AIR QUALITY OUTCOMES

- Attain the federal 8-hour ozone standard by the dates specified in the 2007 AQMPs or U.S. EPA rulemaking for the respective non-attainment areas:
  - South Coast Air Basin by 2024
  - Coachella Valley (original classification 2012; revised attainment date to be determined)
  - Antelope Valley and Western Mojave Desert (original classification 2009; revised attainment date to be determined)
  - Ventura County (original classification 2009; revised attainment to be determined)
  - Imperial County by 2010 (pending final U.S. EPA rulemaking)
- Attain the federal $PM_{2.5}$ standards in the South Coast Air Basin by 2015.
- Reduce the region's greenhouse gas emissions to 1990 levels by 2020[11].
- Amend local government General Plans to limit future growth of residences and other sensitive receptors near major sources of toxic air contaminates and other hazardous air pollutants (e.g., freeways, railyards, and industrial facilities).[12]
- All cities and counties in the region adopt green building standards by 2012.

AIR QUALITY ACTION PLAN

Best Practice	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits								Other Benefits	
				Land Use	Transportation	Water	Energy	Open Space	Economy	Security	Solid Waste	Public Health	Climate Change
SCAG Best Practices													
		X	AQ-1 SCAG should implement control measures from local Air Quality Management Plans (AQMPs) by:		X		X		X			X	X
		X	AQ-1.1 Ensuring that transportation plans, programs, and projects are consistent with State air quality plans for attaining and maintaining the health-based National Ambient Air Quality Standards (NAAQS).		X		X		X			X	X
		X	AQ-1.2 Ensuring compliance with the Transportation Conformity Rule, including the new air quality standards for fine particulate matter (PM2.5) and 8-hour Ozone.		X		X		X			X	X
		X	AQ-1.3 Ensuring that there is continued development of Transportation Control Measures (TCMs) in the South Coast Air Basin (SCAB).		X		X		X			X	X
		X	AQ-2. SCAG, in conjunction with stakeholders, should pursue environmentally sustainable strategies that implement and complement climate change goals and outcomes.	X	X	X	X	X	X			X	X
		X	AQ-2.1 SCAG, in conjunction with stakeholders, should develop policies and guidance that support the greenhouse gas goals set forth in the Global Warming Solutions Act of 2006 (AB 32), which requires a reduction in global warming emissions to 1990 levels by 2020.	X	X		X					X	X
		X	AQ-2.2 SCAG should participate in the development of rules to implement ARB's Group 1 "discrete early action greenhouse gas reduction measures." These include the proposed Low Carbon Fuel Standard, reduction of refrigerant losses from motor vehicle air conditioning maintenance, and increased methane capture from landfills.				X				X	X	X
		X	AQ-2.3 SCAG should participate in the development of ARB's Group 2 non-regulatory activities and greenhouse gas regulations that will be enforceable after January 1, 2010, including electrification, phase two vehicle standards, and more refrigerant controls.				X					X	X
		X	AQ-2.4 SCAG should participate in the development of ARB's Group 3 "traditional control measures" aimed to reduce criteria and toxic air pollutants which have concurrent climate co-benefits.				X					X	X
		X	AQ-2.5 SCAG should provide assistance to local governments on how to address climate change issues in General Plan updates.	X	X	X	X	X	X			X	X
		X	AQ-3 SCAG should develop policies that discourage the location of sensitive receptors that expose humans to adverse air quality impacts by:	X					X			X	
		X	AQ-3.1 Assisting local governments to develop policies that minimize exposure of sensitive receptors and sites (e.g. schools, hospitals, and residences) to major sources of air pollution, including diesel particulate matter emissions, such high-traffic freeways and roads, rail facilities, ports, and industrial facilities.	X					X			X	
		X	AQ-4 SCAG should promote sustainable building practices by:	X		X	X		X		X	X	X

Best Practice	Legislation	Coordination	Constrained Policies	Potential for Direct/Indirect Benefits								Other Benefits	
				Land Use	Transportation	Water	Energy	Open Space	Economy	Security	Solid Waste	Public Health	Climate Change
		X	AQ-4.1 Disseminating information about energy efficiency and green building programs and energy use reduction, such as the EPA's Energy Star Program, the South Coast Air Quality Management District's (AQMD) Equipment Exchange Program, and U.S. Green Building Council's (USGBC) LEED Program through the SCAG web site, web links to other programs, and educational workshops and presentations.	X		X	X		X		X	X	X
X			AQ-4.2 Adopting a policy to strive for carbon neutrality for its own facilities and operations.		X		X		X		X	X	X
		X	AQ-4.3 Recommending utilization of green building practices as potential mitigation measures.	X		X	X		X		X	X	X
X		X	AQ-4.4 Engaging both private and public sectors to assist local government in the creation of green business certification programs for businesses that want to reduce energy usage.				X		X			X	X
Voluntary Local Government Best Practices													
X			AQ-5 Local governments should implement control measures from local Air Quality Management Plans (AQMPs) such as accelerating the turnover of older, more polluting mobile and stationary source equipment using AB 2766 funding per the State Implementation Plan (SIP).[13]		X		X		X			X	X
X			AQ-6 Local governments should support and pursue environmentally sustainable strategies that implement and complement climate change goals and outcomes such as updating their General Plans to help address the State's AB 32 mandate. This should be consistent with state guidelines and requirements.	X	X	X	X		X			X	X
X			AQ-7 Local governments should develop policies that discourage the location of sensitive receptors that expose humans to adverse air quality impacts such as amending General Plans, zoning ordinances, business licensing, and related land use permitting processes to minimize human health impacts from exposure of sensitive receptors to local sources of air pollution. Jurisdictions should consider applicable guidance documents, such as ARB's Air Quality and Land Use Handbook: A Community Health Perspective and the South Coast AQMD's Guidance Document for Addressing Air Quality Issues.	X	X				X			X	
X			AQ-8 Local governments should practice and promote sustainable building practices by:		X		X		X			X	X
X			AQ-8.1 Updating their General Plans and/or zoning ordinances to promote the use of green building practices, which include incorporating LEED design standards and utilizing energy efficient, recycled-content and locally harvested or procured materials.				X		X			X	X
X			AQ-8.2 Developing incentive programs (e.g. density bonuses) to encourage green building and resource and energy conservation in development practices.				X		X			X	X
X			AQ-8.3 Adopting policies that strive for carbon neutrality for their own facilities and operations.		X		X		X			X	X

Best Practices	Legislation	Coordination	Strategic Initiatives	Potential for Direct/Indirect Benefits								Other Benefits	
				Land Use	Transportation	Water	Energy	Open Space	Economy	Security	Solid Waste	Public Health	Climate Change
SCAG Initiatives													
	X	X	AQ-1S Identify new State Implementation Plan (SIP) control strategies that reduce the amount of emissions from the transportation system necessary to reach attainment including transformative goods movement strategies.		X							X	X
	X	X	AQ-2S SCAG, in conjunction with the California Air Resources Board and the South Coast AQMD, should build consensus on how to identify discrete control measures that replace the undefined reductions in attainment plans.		X							X	X

Footnotes

[1] http://lungaction.org/reports/sota07_cities.html

[2] California Air Resources Board. "Recent Research Findings: Health Effects of Particulate Matter and Ozone." January 2004. Available at: http://www.arb.ca.gov/research/health/fs/pm-03fs.pdf

[3] South Coast Air Quality Management District. 2007 Air Quality Management Plan. Available at: http://www.aqmd.gov/aqmp/07aqmp/aqmp/Chapter_2.pdf

[4] Recognizing the need for immediate action, SCAG adopted a resolution in May 2007 urging the federal and state governments to take emergency responses in the face of an air quality health crisis. Subsequently, the ARB, SCAQMD, and SCAG worked to find additional emission reductions from already proposed measures or new measures to help meet the PM2.5 air quality standard, reaching an agreement in September 2007 on emission reduction measures needed to meet the PM2.5 deadline in 2015. Further, the three agencies (i.e., ARB, SCAQMD, and SCAG) acknowledged the need to identify new ways to achieve the 8-hour ozone standard by 2024 by tackling the "black box" emission reductions associated with long-term measures as well as a potentially more stringent federal 8-hour ozone air quality standard. Thus, the three agencies developed a discussion paper which explores potential new or transformative strategies, such as state-of-technology zero and near-zero transportation systems, other mechanisms such as fee-based incentives, and availability of public funding assistance programs.

[5] Personal communication, Richard Bode, California Air Resources Board. 2007.

[6] U.S Environmental Proection Agency. Inventory of Greenhouse Gas Emissions and Sinks 1990-2006. April 2008.

[7] U.S. Environmental Protection Agency. Referenced on National Safety Council webpage: http://www.nsc.org/ehc/mobile/mse_fs.html

[8] California Air Resources Board. "Guidelines for the Generation of Mobile Source Emission Reduction Credits Through Purchase and Operation of New, Reduced-Emission Heavy-Duty Vehicles." September 1995. Available at: http://arb.ca.gov/msprog/mserc/hdcrguid.pdf

[9] California Air Resources Board. "Diesel Health Effects Fact Sheet." Available at: http://www.arb.ca.gov/research/diesel/dpm_draft_3-01-06.pdf

[10] SCAG growth forecast for 2008 Regional Transportation Plan.

[11] This outcome is consistent with State standards included in AB32.

[12] This outcome is consistent with the guidance found in ARB's Air Quality and Land Use Handbook and the South Coast AQMD's Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning and Air Quality Issues in School Site Selection Guidance Document.

[13] In September 1990, AB 2766 was signed into law which authorized a $4 per vehicle surcharge on annual registration fees to fund programs to reduce air pollution from motor vehicles. Under the AB 2766 Program, 40 cents of every dollar collected by the Department of Motor Vehicles is used by cities and counties located in the South Coast Air District to reduce motor vehicle air pollution. Currently, cities and counties receive approximately $19 million AB 2766 funds per year and have expended these funds on a wide range of projects from clean vehicle purchases to various transportation programs to relieve traffic congestion. About half of the funds have been spent on regulatory compliance, the rest on programs whose emission reductions are not directly SIP-quantifiable. ARB will amend its guidance on the use of the fees to include new cost-effectiveness guidelines and a suggested list of SIP creditable projects.